

S
639.9
W-72-R-11
A-4
1966

STATE DOCUMENTS

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana
Project No. W-72-R-11 Name Wildlife Investigations, District Two
Job No. A-4 Title Browse Ecology Investigations
Period Covered: July 1, 1965 - June 30, 1966

ABSTRACT:

Work was begun on compiling a bibliography and literature review of browse ecology and related subjects. A list of exclosures and other range study plots was also begun.

A history of game use on the Ovando Mountain winter range was compiled from old records, annual browse surveys, aerial counts, and pellet group counts. Known numbers of elk using the area since 1948 have varied between 50 and 150.

Range use was reported to be "light" in 1942 and "heavy" in 1948. Annual surveys since 1954 show leader use frequency of serviceberry exceeding 50 percent in 1956, 1964, 1965, and 1966. Average use since 1959 was 42 percent.

Elk have shown preference for mountain maple over 5 other common palatable browse species at this site.

Pellet group counts indicate most of the use has been by elk. Deer pellet groups have declined in recent years.

A 1/2-acre exclosure was built in 1959 and vegetative study transects were established inside and outside the exclosure. These transects were "read" again in 1965. The readings showed that the density of palatable browse increased 20 percent and unpalatable browse decreased 3 percent inside the exclosure. Outside, the density of palatable browse remained the same, while unpalatable species declined 12 percent. The overstory of Douglas fir increased both inside and outside. The height of palatable browse species increased 7 percent inside and 6 percent outside. Conifer heights increased 41 percent inside and 28 percent outside.

Twig measurements of serviceberry indicated that browsed plants produced longer, but fewer, leaders than unbrowsed plants. Unbrowsed choke-cherry plants produced longer leaders than browsed plants.

An experimental planting of 4,000 shrubs was made on the Bitterroot Game Range. Periodic observations of survival and game use will be made.

OBJECTIVES:

To learn how to best maintain, or increase, the forage supply on winter game ranges in western Montana.

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601

PROCEDURE:

1. A literature review and a bibliography were begun.
2. A list of existing exclosures and range study sites in District Two was begun.
3. A history of game use and forage trends on Ovando Mountain, a Department owned winter elk range, was completed, and vegetative measurements were made on transect lines established in 1959 inside and outside of a one-acre exclosure.
4. An experimental shrub planting was made on the Bitterroot Game range to test the value of some easily procured shrubs as big game forage and cover.

FINDINGS:

Literature Review

Literature concerning browse ecology in Montana is rather sparse. Publications in this field in Montana and similar areas are being reviewed and a bibliography is being prepared.

Study Plots & Exclosures

A partial list of exclosures and study plots was compiled. The locations of eight exclosures in District Two are known. These are shown in Table 1.

The Ovando Mountain exclosure area was selected for detailed examination during the year. This is one of the better browse big game winter ranges in western Montana. This range was created by forest fires in 1889 and 1919 and has maintained itself because of partial failure of conifers to re-establish themselves on the site. The "burn" area comprises approximately three square miles on the south exposure of the mountain about four miles north of the town of Ovando. Snow depth probably reaches 30 inches during the average winter. Elk are able to winter on the area, but deer are forced to lower elevations by the snow. Grazing rights were acquired by deed and lease by the Montana Fish and Game Department between 1956 and the present. Prior to this time the area was used for domestic sheep range.

This range was reported to have wintered a small herd of elk with a resulting "20% browse use" in the 1941-42 Big Game Study of the Blackfoot. Winter Game Studies in 1947-48 reported "heavy browse use" and an estimate of 80 elk wintering on Ovando Mountain.

Aerial "spot counts" of elk on Ovando Mountain in recent years are as follows:

1958 - 110 elk	1963 - 55 elk
1960 - 84 elk	1964 - 69 elk
1962 - 51 elk	1965 - 141 elk

Observations have been made each spring since 1955 to determine browse utilization and condition. The results are shown in Table 2.

Some preference has been shown for mountain maple over other species at this site as shown by the 78% average use in recent years. The apparent difference in species utilization at this site may be influenced by plant height as snow depth is significant and mountain maple is the tallest species at the site.

Pellet group counts have shown that approximately 90 percent of the use at this site has been by elk. Numbers of pellet groups observed since 1960 during the spring browse surveys are given below:

	<u>Elk groups per acre</u>	<u>Deer groups per acre</u>
1960	160	40
1961	340	40
1962	320	40
1963	210	18
1964	(No check; fresh snow)	
1965	200	0
1966	<u>130</u>	<u>10</u>
Average	227	25

Assuming twelve groups of pellets voided each day per elk or deer, this site has received approximately 19 elk days and two deer days use per acre since 1960.

Trend in Browse Density:

A 1/2-acre enclosure was constructed in 1959 and line intercept transects were established inside and outside of the enclosure. The results of the transect readings are shown in Table 3.

The density of palatable browse increased 20 percent while the density of the unpalatable species decreased 3 percent from 1959 to 1965 inside the enclosure. Outside the enclosure the density of the palatable species remained the same while the unpalatable ones decreased 12 percent. The overstory of Douglas fir increased both inside and outside the enclosure.

Evergreen *Ceanothus* showed the greatest variation in density trend between the grazed and ungrazed sites. On the outside site it was 26 percent less dense. Inside the enclosure it increased 27 percent in density.

Bittercherry was approximately 35 percent less dense, both in and out of the enclosure. It was noted considerable bittercherry had died in a lightly hedged form class.

The height of most of the palatable browse plants and trees along the transect lines were recorded in 1959 and they were remeasured in 1965. Results are given in Table 4.

These bushes increased 7.4 percent inside the exclosure and 6.0 percent outside in the six year period. Conifer trees increased 40.6 percent inside the exclosure and 27.9 percent outside.

Browse Production and Vigor:

Twenty five serviceberry and five chokecherry bushes inside the Ovando Mountain Game Exclosure and the same number outside were tagged and the annual growth above the tag measured and recorded in the fall of 1959 when the exclosure was constructed. These tagged plants were remeasured after the growing seasons of 1960, 1961, 1962, and 1965. It was intended to determine if the plants would reflect a difference in vigor in the used and unused plots and the difference in browse production between years. Results are given in Table 5.

The average growth of serviceberry leaders was greater on plants outside the exclosure than inside.

Inversely, average chokecherry leader growth was greatest inside the exclosure.

There were less leaders on the tagged stems of both serviceberry and chokecherry outside the exclosure.

Over 60% of the stems tagged originally on plants inside the exclosure died and the tag had to be put on another stem during the 6 year period. Many tags were pulled off the plants on the outside by game animals and new stems had to be tagged, so mortality of stems could not be checked.

Tentative Conclusions:

1. The density of the palatable species of browse remained stable when used at an intensity of 19 elk days per acre and increased 20% with non-use.
2. Serviceberry density decreased 6% when an average of 42% of the stems was grazed and increased 18% with no use.
3. Mountain maple density remained the same when an average of 83% of the stems was grazed, and increased 23% with no use.
4. The palatable browse plants became 4.8 inches taller during the six year period with no use.
5. The conifer trees in the exclosure became 46.8 inches taller during the six year period.
6. Measuring stem length alone does not give a true index of plant vigor and production.

Experimental Browse Plantings

A total of 4,000 shrubs, consisting of 3,000 Caragana and 1,000 Russian olive were planted along the edge of former dry-land wheat fields on the Bitterroot Game Range. These species were selected because they were easily obtained from the

State Forester, and available information indicated they were palatable to game. Caragana had been observed by the writers to be heavily hedged by white-tailed deer in the Salmon Lake area, but to still retain its vigor. Russian olive was planted to form higher cover for travel lanes. It may also furnish food, since studies in Utah indicate it is eaten by mule deer.

Periodic observations of the survival and utilization of these shrubs will be made and recorded.

Prepared by: Reuel Janson and Fred Hartkorn

Date: May 2, 1967

Approved by: Wynn G. Freeman

Table 1. Partial list of exclosures and study sites in District Two

Name & hunting dist.	Location	Size	Year built	Built by	Purpose
East Fork 27	$\frac{1}{4}$ mi. W. of mouth of Guide Cr. on East Fork of Bitterroot	$\frac{1}{2}$ A.	1952	Dept., F.S. & Ravalli Co. Sportsmen	Browse study Conifer survival (game)
Sula Horse Pasture 27	Forest Service Horse Pasture at Sula Ranger Station	$\frac{1}{2}$ A.	1954	Dept., F.S.	Grass utilization & trend study (game, livestock)
Dick Creek Plots 27	On old Sula-Wisdom road	3- $\frac{1}{2}$ A. plots	1954	Dept., F.S.	Grass utilization & trend study (game, livestock)
Dry Fork 22	Dry Creek, west of Superior	1 A.	1961	Dept., F.S.	Browse trend study (game)
Eddy Creek 20	Between Nine-mile Cr. and Alberton	1 A.	1957	Dept., F.S.	Range & watershed trend (game, livestock, browse utilization)
Salmon Lake 28	Along Hiway 209 at Salmon Lake	$\frac{1}{2}$ A.	1953	Dept., W.M. F. & G. Ass'n, University	Browse trend (game)
Ovando Mtn. 28	S $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 1, T15N, R12W	$\frac{1}{2}$ A.	1959	Dept.	Browse Utilization & trend (game)
Modesty Ridge 213	Modesty Cr., No. of Anaconda	$\frac{1}{2}$ A.	1960	Dept., A.C.M.	Grass trend (game, livestock)

Table 2. Utilization of browse species on Ovando Mountain winter elk range

Winter	% Leaders Used						
	Serviceberry	Maple	Ceanothus	Chokecherry	Mtn. Ash	Willow	Bitterbrush
1954-55	32	47	17	18	35	38	15
1955-56	58	63	23	36	10	-	70
1956-57	47	66	24	36	40	-	50
1957-58	42	35	9	6	0	-	2
1958-59	30	-	-	-	-	-	-
1959-60	28	-	-	-	-	-	-
1960-61	14	-	-	-	-	-	-
1961-62	38	-	-	-	-	-	-
1962-63	22	63	-	-	-	-	-
1963-64	66	88	-	-	-	-	-
1964-65	60	90	-	-	-	-	-
1965-66	69	90	50	48	62	-	10
1960-65 Ave.	42	83	-	-	-	-	-

Table 3. Line intercept transect results; Ovando Mountain exclosure site (feet of intercept)

	Service- berry	Choke- cherry	Evergreen Ceanothus	Mtn. maple	Mtn. Ash	Total palatables	Rose	Snow- berry	Bitter cherry	Total Un- palatables	Overstory D. Fir
Inside											
1959	185.1	168.5	82.7	21.9	10.0	468.2	16.7	59.4	8.4	84.5	7.1
1965	224.9	207.6	112.6	28.3	9.6	583.0	8.6	67.8	5.5	81.9	21.4
Percent change	+18	+19	+27	+23	-4	+20	-48	+12	-35	-3	+66
Outside											
1959	212.2	152.0	112.9	73.3	12.9	563.3	11.7	41.9	34.5	88.1	52.3
1965	199.6	194.5	90.6	72.9	9.6	567.2	11.7	43.8	22.2	77.7	56.6
Percent change	-6	+22	-20	- .5	-26	+ .5	0	+4	-36	-12	+8

Table 4. Trend in Browse plant heights - Ovando Mountain enclosure site

Species	Outside Enclosure Average height (feet)			Inside Enclosure Average height (feet)		
	1959	1965	Change	1959	1965	Change
Serviceberry	4.40	4.72	+6.8%	4.69	5.37	+12.7%
Mtn. Maple	5.94	6.4	+7.2%	11.01	11.18	+ 1.6%
Mtn. Ash	2.31	2.32	+ .4%	2.93	3.1	+ 5.5%
Chokecherry	3.48	3.55	+2.0%	3.13	3.2	+ 2.2%
Bittercherry	3.55	3.65	+2.7%	3.44	3.31	- 3.8%
Evergreen						
Ceanothus	3.0	3.40	+11.8%	2.8	3.16	+11.4%
Willow	-	-	-	8.1	6.95	-14.2%
D. Fir	9.47	13.08	+27.6%	5.7	9.59	+40.6%
P. Pine	3.4	5.7	+40.4%	-	-	
All Browse	4.24	4.51	+ 6.0%	5.03	5.43	+ 7.4%
All Trees	9.20	12.76	+27.9%	5.7	9.59	+40.6%

Table 5. Browse leader growth, Ovando Mountain enclosure, 1965

	Inside		Outside	
	1959	1965	1959	1965
<u>Amelanchier</u>				
No. plants	25	25	25	25
Total leaders	257	254	216	154
Total leader length	455"	700"	518"	502"
Ave. leader length	2.5"	2.76"	2.4"	3.26"
Ave. leaders/stem	10.3	10.2	8.6	6.2
<u>Prunus</u>				
No. plants	5	5	5	3
Total leaders	53	30	56	22
Total leaders length	95	52	97	29
Ave. leader length	1.8"	1.73"	1.7"	1.32"
Ave. leaders/stem	10.6	6.0	11.5	7.3

